

## Supplementary Online Content

Santaella-Tenorio J, Wheeler-Martin K, DiMaggio CJ, et al. Association of recreational cannabis laws in Colorado and Washington State with changes in traffic fatalities, 2005-2017. *JAMA Intern Med*. Published online June 22, 2020. doi:10.1001/jamainternmed.2020.1757

**eTable 1.** Predictors Used in Analyses (2005-2013)

**eTable 2.** Pre-RCL Predictor Values for the Exposed Unit and the Synthetic Control Unit

**eFigure 1.** Fatality Rate Gaps per 1 Billion VMT in Colorado and All Eligible Control States vs Each State's Synthetic Control

**eFigure 2.** Fatality Rate Gaps per 1 Billion VMT in Washington and All Eligible Control States vs Each State's Synthetic Control

**eReferences.**

This supplementary material has been provided by the authors to give readers additional information about their work.

eTable 1. Predictors Used in Analyses (2005-2013)<sup>a</sup>

Unemployment	Annual average unemployment percentages for each state were obtained from the Bureau of Labor Statistics, U.S. Department of Labor. <sup>1</sup>
Median household income	Annual median household income values by state were obtained from the U.S. Census Bureau. <sup>2</sup>
State annual vehicle miles traveled	Vehicle miles traveled for each state are calculated as the total annual miles of vehicle travel. The data are provided by the Federal Highway Administration, which are collected from state reports on traffic data counts. States collect the data from permanent automatic traffic recorders on public roadways. The Federal Highway Administration reports total vehicle miles traveled as an annual average for states and daily average for Federal-Aid Urbanized Areas (FAUA). <sup>3</sup> Data were obtained from the Office of Highway Policy Information U.S. Department of Transportation. <sup>4</sup>
Laws decriminalizing the possession of small amounts of cannabis	These laws reduce the penalty for possessing a small amount of cannabis to a civil fine rather than a criminal penalty (i.e., imprisonment). This variable was coded as time-varying predictor, with each year coded as “1” if the state had enacted a medical cannabis law; and “0” otherwise. Information on these laws was obtained from OLR Research Report 2010-R-0204, <sup>5</sup> and the Marijuana Policy Project. <sup>6</sup>
Medical cannabis laws	These laws allow the production, possession and use of cannabis for medical purposes. This variable was coded as time-varying predictor, with each year coded as “1” if the state had enacted a medical cannabis law; and “0” otherwise. We coded the first year the state enacted the law as the proportion of the year the law was in effect. Data on the enactment of medical cannabis laws were obtained from Pacula et al., (2014). <sup>7,8</sup>
Speed limits of 70 miles per hour or greater	This variable was coded as time-varying predictor, each year coded as “1” if the State had a speed limit of 70 miles per hour or great in any State roads; and “0” otherwise. Data were obtained from the Summary of State Speed Laws yearly editions, from the National Highway Traffic Safety Administration, U.S. Department of Transportation, <sup>9</sup> and from the Traffic Safety Trends State Legislative Action reports from the National Conference of State Legislatures. <sup>10</sup>
Primary seat belt laws enforcement	Primary enforcement laws allow a police officer to stop and cite a motorist solely for not using a seat belt. We coded it as time-varying predictor, each year coded as “1” if the state had primary seat belt law enforcement; and “0” otherwise. Data was obtained from the Insurance Institute for Highway Safety, Highway Loss Data Institute. <sup>11</sup>
Graduated driver license laws	These laws require new drivers to acquire critical driving skills as they advance through beginner/immediate phases, under conditions that minimize risk, before they can achieve full licensure. <sup>12</sup> We coded it as time-varying predictor, each year coded as “1” if the state had a graduate driver license law; and “0” otherwise. We coded the first year the state enacted the law as the proportion of the year the law was in effect. Data on these laws were obtained from Dee et al., (2005) <sup>12</sup> and The Insurance Institute for Highway Safety. <sup>13</sup>
Drug per se laws	Laws setting legal limits for blood concentrations of certain drugs for drivers, including zero-tolerance laws. <sup>14</sup> We coded this variable as time-varying predictor, each year coded as “1” if the state had a drug per se law; and “0” otherwise. We coded the first year the state

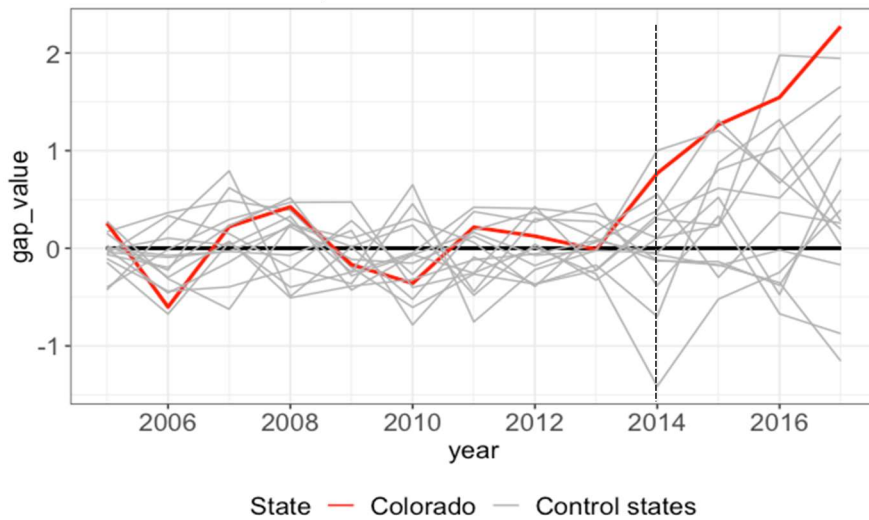
	enacted the law as the proportion of the year the law was in effect. Data were obtained from the National Highway Traffic Safety Administration <sup>14</sup> and from Anderson and Rees (2015). <sup>15</sup>
Laws banning cell phone use and texting while driving	These laws ban hand-held cellphone conversations or/and texting while driving. We used two different measures, one for all-driver bans and another for teenage-driver bans. These variables were coded as time-varying predictors, each year coded as “1” if the state had a law banning cell phone use and texting while driving; and “0” otherwise. We coded the first year the state enacted the laws as the proportion of the year these laws were in effect. Data were obtained from McCartt et al., (2014) <sup>16</sup> and from HandsFreeInfo.com. <sup>17</sup>
State annual expenditures for highway law enforcement and safety	Data on annual expenditures for highway law enforcement and safety were obtained from the Office of Highway Policy Information U.S. Department of Transportation. <sup>4</sup>
Blood alcohol content laws (0.08 g/dL)	These laws make it a crime to drive with a blood alcohol concentration at or above 0.08 percent (8 grams of alcohol per deciliter of blood). We coded this variable as time-varying predictor, each year coded as “1” if the state had a blood alcohol content law with a limit at a lower threshold of 0.08 g/dL; and “0” otherwise. Data on enactment of these laws were obtained from Freeman (2007). <sup>18</sup>
Administrative license revocation laws	These laws provide for the administrative suspension of a driver’s license prior to conviction for driving while intoxicated. <sup>19</sup> The driver’s license is suspended by licensing agencies when the driver’s test result is at or above 0.08 g/dL or when the driver refuses to be tested. <sup>19</sup> We coded this variable as time-varying predictor, each year coded as “1” if the state had a drug per se law; and “0” otherwise. Data were obtained from Freeman (2007) <sup>18</sup> and from the U.S. Department of Transportation, National Highway Traffic Safety Administration. <sup>19</sup>

<sup>a</sup> Data on predictors are from 2005 to 2013, the pre-RCL period in this study.

eTable 2. Pre-RCL Predictor Values for the Exposed Unit and the Synthetic Control Unit

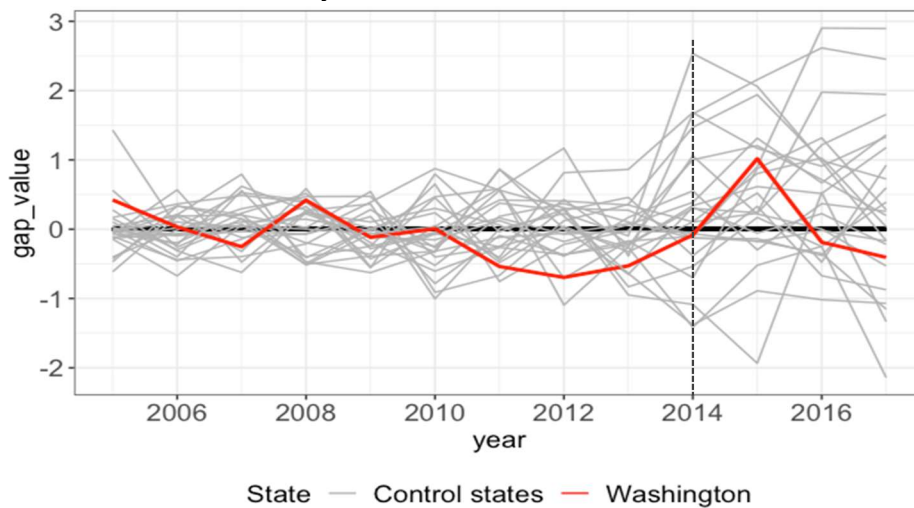
	Colorado		Washington	
	Exposed	Synthetic	Exposed	Synthetic
Unemployment	6.30	6.24	7.13	7.86
Median income	58183.11	58138.84	57308.67	59216.22
Seat belt laws	0.00	0.62	1.00	0.91
Speed limit 70+	1.00	0.32	1.00	0.37
Graduate license	1.00	1.00	1.00	1.00
Ban text-driving adult	0.45	0.47	0.67	0.78
Ban text-driving adolescents	0.94	0.78	0.67	0.83
Highway expenditures	5.41	5.62	5.47	5.66
VMT per driver	13134.93	13476.77	11288.84	12750.44
Alcohol sales	10.35	10.34	10.16	10.19
Drug per se laws	0.06	0.08	0.00	0.12
Medical cannabis laws	1.00	0.36	1.00	0.70
Decriminalization cannabis laws	1.00	0.11	0.00	0.40
Rate traffic fatalities in 2005	12.64	12.38	11.70	11.28
Rate traffic fatalities in 2009	10.06	10.23	8.72	8.84
Rate traffic fatalities in 2013	10.24	10.25	7.62	8.15

eFigure 1. Fatality Rate Gaps per 1 Billion VMT in Colorado and All Eligible Control States vs Each State's Synthetic Control



States with pre-intervention MSPEs 2 times higher than the MSPE for Washington are not included

eFigure 2. Fatality Rate Gaps per 1 Billion VMT in Washington and All Eligible Control States vs Each State's Synthetic Control



States with pre-intervention MSPEs 2 times higher than the MSPE for Washington are not included

## eReferences.

1. Bureau of Labor Statistics. United States Department of Labour. Annual average series. Employment status of the civilian noninstitutional population, annual averages. <http://www.bls.gov/lau/staadata.txt> Accessed January 20, 2020.
2. U.S. Census Bureau. Historical income tables. Table H-8. Median household income by state. <https://www.census.gov/data/tables/time-series/demo/income-poverty/historical-income-households.html> Accessed January 22, 2020.
3. FHWA. Highway Statistics. Federal Highway Administration, US Department of Transportation. Vehicle Miles Traveled. <https://www.transportation.gov/mission/health/vmt-capita> Accessed: January 12, 2020.
4. U.S. Department of Transportation, Federal Highway Administration, Office of Highway Policy Information, Highway Statistics. <http://www.fhwa.dot.gov/policyinformation/statistics.cfm> Accessed January 22, 2020.
5. Scott EM. Marijuana decriminalization. Office of Legislative Research Report No. 2010-R-0204. Connecticut General Assembly. <https://www.cga.ct.gov/2010/rpt/2010-R-0204.htm>. Accessed January 22, 2020.
6. The Marijuana Project. State Decriminalization Laws. <https://www.mpp.org/issues/decriminalization/state-laws-with-alternatives-to-incarceration-for-marijuana-possession/> Accessed: January 22, 2020.
7. Pacula R, Boustead A, Hunt P. Words can be deceiving: a review of variation among legally effective medical marijuana laws in the United States. *J Drug Policy Anal.* 2014;7(1):1–19.
8. Santaella-Tenorio J, Mauro CM, Wall MM, et al. US Traffic Fatalities, 1985-2014, and Their Relationship to Medical Marijuana Laws. *Am J Public Health.* 2017;107(2):336-342.
9. National Highway Traffic Safety Administration, U.S. Department of Transportation. Summary of State Speed Laws yearly editions.
10. National Conference of State Legislatures. Traffic Safety Trends: State Legislative Action. 2020. <https://www.ncsl.org/research/transportation/speeding-overview.aspx> Accessed January 20, 2020.
11. Insurance Institute for Highway Safety, Highway Loss Data Institute. Seat belts Laws data. <http://www.iihs.org/iihs/topics/laws/safetybeltuse?topicName=Safety> Accessed January 22, 2020.
12. Dee T, Grabowski D, Morrissey M. Graduated driver licensing and teen traffic fatalities. *J Health Econ.* 2005;24(3):571-589.
13. Insurance Institute for Highway Safety, Highway Loss Data Institute. Graduated Licensing Laws by State. <https://www.iihs.org/topics/teenagers/graduated-licensing-laws-table> Accessed January 20, 2020.
14. U.S. Department of Transportation, National Highway Traffic Safety Administration. Drug Per Se Laws: A Review of Their Use in States. 2010. DOT HS 811 317
15. Anderson D, Rees D. Per se drugged driving laws and traffic fatalities. *Inter Rev Law Econ.* 2015;42:122-134.
16. McCartt A, Kidd D, Teoh E. Driver cellphone and texting bans in the United States: evidence of effectiveness. *Ann Adv Automot Med.* 2014;58:99-114.

17. HandsFreeInfo.com. Index: Cell phone laws, legislation by state.  
<http://handsfreeinfo.com/index-cell-phone-laws-legislation-by-state/> Accessed January 22, 2020.
18. Freeman D. Drunk driving legislation and traffic fatalities: New evidence on BAC 08 laws. *Contemp Econ Policy*. 2007;25(3):293-308.
19. U.S. Department of Transportation, National Highway Traffic Safety Administration. Digest of Impaired Driving And Selected Beverage Control Laws. 2017. DOT HS 812 394.  
<https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/documents/812394-digest-of-impaired-driving-and-selected-beverage-control-laws.pdf> Accessed January 22, 2020.